Table 1										
Type of Lance	Time Needed to Make a 15 cm Hole (sec)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 80 l/min) (liters)	Pierce Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
BROCO	187.38	246.38	249.8	0.080	1.315	969	17.4	-	-	1.55
	183.60	241.30	244.8	0.082	1.314	949	17.0	-	-	1.56
(avg)	**185.49**	**243.84**	**247.3**	**0.081**	**1.315**	**959**	**17.2**	-	-	**1.56**
BROCO with FEP	120.51	129.54	160.7	0.124	1.075	509	9.1	78	0.8	1.38
	110.20	147.32	146.9	0.136	1.337	579	10.4	89	0.9	1.72
	109.79	121.92	145.1	0.138	1.121	480	8.6	74	0.7	1.44
	114.67	132.08	152.9	0.131	1.152	519	9.3	80	0.8	1.48
(avg)	**113.54**	**132.72**	**151.4**	**0.132**	**1.169**	**522**	**9.3**	**80**	**0.8**	**1.49**
BROCO with Fe tubing	**149.93**	**187.96**	**199.9**	**0.100**	**1.254**	**1316**	**23.6**	-	-	**2.64**

Table 1										
Type of Lance	Time Needed to Make a 15 cm Hole (sec)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 80 l/min) (liters)	Pierce Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
BROCO with FEP and Fe tubing	76.81	71.12	102.4	0.195	0.926	498	8.9	43	0.4	2.03
	81.20	83.82	108.3	0.185	1.032	587	10.5	51	0.5	2.28
	73.10	81.28	97.5	0.205	1.112	569	10.2	49	0.5	2.46
(avg)	**77.04**	**78.74**	**102.7**	**0.195**	**1.022**	**551**	**9.9**	**47**	**0.4**	**2.25**

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Table 2

Type of Lance	Time Needed to Make a 15 cm Hole (sec)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 80 l/min) (liters)	Pierce Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
BROCO	214.65	292.10	286.20	0.070	1.361	1149	20.6	-	-	1.61
	183.60	279.40	244.80	0.082	1.522	1099	19.7	-	-	1.80
	221.13	273.05	294.84	0.068	1.235	1074	19.2	-	-	1.46
(avg)	**206.46**	**281.52**	**275.28**	**0.073**	**1.373**	**1107**	**19.8**	**-**	**-**	**1.62**
BROCO with FEP tubing	111.11	129.54	148.10	0.135	1.166	509	9.1	78	0.8	1.50
	118.13	149.86	157.50	0.127	1.269	589	10.6	90	0.9	1.64
	96.30	114.30	128.40	0.156	1.187	450	8.0	69	0.7	1.52
(avg)	**108.51**	**131.23**	**144.67**	**0.139**	**1.207**	**516**	**9.2**	**79**	**0.8**	**1.55**

Table 2										
Type of Lance	Time Needed to Make a 15 cm Hole (sec)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 80 l/min) (liters)	Pierce Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
BROCO with two FEP tubings	121.15	134.62	161.53	0.124	1.111	529	9.5	169	1.7	1.55
	119.06	144.78	158.75	0.126	1.216	569	10.2	182	1.8	1.69
	88.60	93.98	118.13	0.169	1.061	370	6.6	118	1.2	1.48
(avg)	**109.60**	**124.46**	**146.14**	**0.140**	**1.129**	**489**	**8.8**	**156**	**1.6**	**1.59**
BROCO with KYNAR tubing	104.24	100.33	138.99	0.144	0.962	395	7.1	92	0.9	1.29
	91.84	88.90	122.45	0.163	0.968	350	6.3	81	0.8	1.30
	96.28	105.41	128.37	0.156	1.095	415	7.4	96	1.0	1.47
	84.76	76.20	113.01	0.177	0.899	300	5.4	70	0.7	1.21

Table 2

Type of Lance	Time Needed to Make a 15 cm Hole (sec)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 80 l/min) (liters)	Pierce Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
	85.12	100.33	113.49	0.176	1.179	395	7.1	92	0.9	1.58
(avg)	**92.45**	**94.23**	**123.26**	**0.163**	**1.021**	**371**	**6.6**	**86**	**0.9**	**1.36**
BROCO with PTFE tubing	**172.72**	**158.75**	**230.29**	**0.087**	**0.919**	**624**	**11.2**	**182**	**1.8**	**1.26**

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Table 3

Type of Lance	Length of Cut (cm)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 235 l/min) (liters)	Cutting Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
Outlet Pressure = 50 psi; Oxygen Flow= 235 l/min; Steel Plate; Thickness = 2.5cm										
BROCO	24.0	35.0	87.3	0.609	0.889	138	2.46	-	-	0.358
BROCO + graphoil	24.0	25.5	135.2	0.695	0.739	100	1.80	-	-	0.298
BROCO	23.0	32.5	136.9	0.658	0.930	128	2.29	-	-	0.375
BROCO	24.5	35.5	152.4	0.630	0.912	140	2.50	-	-	0.368
BROCO + graphoil	23.0	28.0	139.6	0.645	0.786	110	1.97	-	-	0.316
Outlet Pressure=50 psi; Oxygen Flow=235 l/min; Steel Plate; Thickness=7.0cm										
BROCO	7.0	56	289.3	0.095	0.758	220	3.94	-	-	0.305
BROCO + graphoil	9.5	40.5	222.9	0.169	0.721	159	2.85	-	-	0.287
BROCO	8.5	65	309.1	0.108	0.824	256	4.58	-	-	0.332

Table 3

Type of Lance	Length of Cut (cm)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 235 l/min) (liters)	Cutting Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
BROCO + graphoil	10.0	37.5	235.4	0.166	0.624	147	2.64	-	-	0.251
Outlet Pressure=80 psi; Oxygen Flow=80 l/min; Steel Plate; Thickness=1.1 cm										
BROCO	26.0	34.5	49.8	0.696	0.924	136	2.43	-	-	1.093
BROCO + graphoil	26.0	13.5	40.7	0.851	1.097	53	0.95	-	-	0.523
Al + 7 Fe wire + graphoil (A)	25.0	28.5	45.2	0.738	0.841	86	1.54	-	-	0.764
BROCO	26.0	30.0	44.4	0.779	0.899	118	2.11	-	-	1.066
BROCO + graphoil (A)	25.5	26.5	37.4	0.909	0.945	104	1.87	-	-	1.117

Table 3

Type of Lance	Length of Cut (cm)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 235 l/min) (liters)	Cutting Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
Al + 7 Fe wire + graphoil	25.5	37.0	44.7	0.760	1.103			-	-	1.003
BROCO	26.0	30.0	39.9	0.868	1.002	118	2.11	-	-	1.186
Al + 7 Fe wire + graphoil (B)	26.0	22.5	35.76	0.969	0.839	68	1.22	-	-	0.684
Al + 7 Fe wire + graphoil (B)	26.0	26.0	34.7	1.124	1.124	79	1.41	-	-	0.908
Outlet Pressure=80 psi; Oxygen Flow= 80 l/min; Steel Plate; Thickness=5.7cm										

Table 3

Type of Lance	Length of Cut (cm)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 235 l/min) (liters)	Cutting Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
Al + 7 Fe wire + graphoil (B)	7.5	34.0	51.6	0.194	0.878	103	1.84	-	-	0.799
BROCO	5.5	46.0	76.6	0.096	0.801	181	3.24	-	-	0.947

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Table 4

Type of Lance	Time Needed to Make a 15 cm Hole (sec)	Length of Lance Burned (cm)	O_2 Needed for the Run (@ 80 l/min) (liters)	Pierce Rate (cm/sec)	Lance Burning Rate (cm/sec)	Material Burned				Molar ratio
						Fe		C_2F_4		Lance: O_2
						g	mol	g	mol	Mol/mol
BROCO	194.88	258.5	259.84	0.077	1.326	1017	18.2	-	-	1.57
BROCO + PCTFE + FE (10")	88.4	84.0	117.87	0.170	0.950	381	6.8	102	1.0	1.48
BROCO + PCTFE (foil)	105.31	104.0	140.41	0.142	0.988	459	8.3	127	1.3	1.53
BROCO + PCTFE + Fe (10")	99.93	95.0	133.24	0.150	0.951	424	7.5	116	1.2	1.46

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